AGRICULTURAL Research

August/1961

U.S. Department of Agriculture

AGRICULTURAL
Research

August 1961/Volume 10, No. 2

Contents

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Dedicated to Research

Ambitious plans for animal disease research are about to take a gigantic step forward. In a few weeks the new National Animal Disease Laboratory at Ames, Iowa, will be dedicated.

The impact of research to be done there cannot be fully anticipated, but the facilities are the most modern anywhere.

The $16 million laboratory is located on a 318-acre tract near Iowa State University. There are 7 major buildings and 25 field buildings, with ample room for expansion.

Congress provided the funds for building and equipping the laboratory. The site was selected by a committee which considered 80 different locations. The facility was officially turned over to USDA early in May.

Research to be undertaken here involves studies of the cause, mode of transmission, method of diagnosis, and methods for prevention, treatment, and control of infectious diseases of all classes of domestic livestock, including poultry. These include diseases caused by bacteria, fungi, viruses, Rickettsiae, and noninfectious pathological conditions.

In addition, space and equipment are provided for diagnostic and disease control work required in USDA's livestock disease control and other regulatory programs.

Research can be conducted simultaneously on 25 different animal diseases. Laboratory units are so arranged that there is no possibility of exposure of animals in one section to any disease on which work may be underway in another section.

Safety factors, many of them unusual, are built into the buildings to prevent escape of infective agents to the outside world and to protect laboratory workers from agents which are communicable to humans.

This modern, well-equipped laboratory is of vital importance to the welfare of agriculture and the Nation. For the first time we have modern facilities to study animal diseases, which raise the cost of farm production, drain off farm income, and threaten human as well as animal health. The all-out attack on animal diseases will provide us with the knowledge necessary to build a stronger livestock industry and to provide even more wholesome food for human consumption.

AGRICULTURAL RESEARCH is published monthly by the Agricultural Research Service, United States Department of Agriculture, Washington 25, D.C. Printing has been approved by the Bureau of the Budget, August 15, 1958. Yearly subscription rate is $1 in the U.S. and countries of the Postal Union, $1.50 in other countries. Single copies are 15 cents each. Subscription orders should be sent to Superintendent of Documents, Government Printing Office, Washington 25, D.C.

AGRICULTURAL RESEARCH SERVICE
United States Department of Agriculture

Growth Through Agricultural Progress

EARLIER PASTURE INCREASED FORAGE LONGER GRAZING

may be advantages gained by ranchers who regulate stocking rates and grazing of their livestock on . . .

CRESTED WHEATGRASS

This plant yields good forage before native grasses can be grazed in the spring.

■ Ranchers can regulate stocking rates and grazing on crested wheatgrass pastures to obtain more efficient production of this valuable forage.

The number of animals and the length of time they graze can be adjusted so the grass yields the most feed per acre, provides more forage early in the spring, or supports livestock longer, results of recent USDA studies indicate.

To provide the *most* feed, ARS agronomist D. N. Hyder suggests grazing animals on crested wheatgrass from the time the seedhead is in its sheath (head-in-boot stage) until flowering. (This can be gaged by shielding a few check plants from the stock.) But there will be no second growth for later grazing.

To provide more forage *early* in the spring, he suggests that grazing start earlier, when grass is about 6 inches tall. Animals should be removed from the pasture when plants reach the head-in-boot stage. A second crop might be produced by adjusting stocking rates so plants will have been grazed closely by the end of this period.

To support animals a *longer* time, Hyder suggests rotating stock between crested wheatgrass pastures grazed for most feed and those managed for early feed. Most years the early grazed plants will produce a second crop of grass, so that stock could be started on early range, shifted to the other, then returned for a second grazing.

Extra forage from an early stocked range, however, isn't likely unless the grass is grazed to about 1 inch, Hyder's 6-year study at Burns, Oreg., shows.

Turn Page

CRESTED WHEATGRASS

(Continued)

He clipped plants to a 1-inch height during the head-in-boot stage of growth, causing them to develop leafy vegetative stems from buds close to the base. These stems should provide good summer grazing after field-curing. Insufficient spring moisture, though, prevents such growth.

If plants aren't grazed closely, they will produce reproductive stems which lose palatability rapidly, following heading and drying of the leaves. The reproductive stems are slow to disintegrate, and thus interfere with grazing the next year.

By clipping experimental plots closely until plants reached bloom stage, the researcher kept most of the undesirable stems and second growth from developing.

Crested wheatgrass is a hardy perennial sown in many semiarid Western areas. It provides early spring grazing before native grasses produce enough feed to support livestock.

This grass can withstand early intensive grazing because much—not all—root growth and carbohydrate accumulation occurs by the time plants are about 6 inches tall.☆

Mature reproductive stems of unclipped plants, left and right. Clipped plant, center, formed leafy second growth of vegetative stems.

SURFACTANT INHIBITS PLANT VIRUSES

A compound normally used as a sticking, spreading, or wetting agent may stop insects from introducing diseases

■ A surfactant that has clear-cut antiviral activity in plants has been found in USDA greenhouse tests.

Tests are underway to find if the compound is useful as a preventive of virus introduction into plants by insects, a major factor in the spread of viruses.

The surfactant, dioctyl sodium sulfosuccinate (DOSS), markedly reduced development of five virus diseases in bean plants. Surfactants, compounds which reduce the surface tension of liquids, are commonly added to agricultural chemicals to improve their contact with plant surfaces or to facilitate penetration.

DOSS is not a cure for plants with established virus diseases, because it is not absorbed or translocated in effective amounts. It does provide a valuable basis for further research on chemical control of viruses.

Effectiveness of DOSS in arresting virus development was found by ARS plant pathologist I. R. Schneider and plant physiologist J. W. Mitchell in their search for surfactants to combine with antibiotics in the experimental control of virus diseases. They found, however, that application of the surfactant alone to plant leaves 15 minutes, and in some cases up to 30 hours, after inoculation with viruses effectively inhibited disease development. The experiments were made at the Agricultural Research Center, Beltsville, Md.

Paired leaves of pinto bean plants were inoculated by brushing leaf surfaces with extracts of virus-infected plant juice and an abrasive. An aqueous solution of DOSS, 2,000 p.p.m., was applied 15 minutes later to one leaf of each pair by mechanical spray or cotton swab. Treated leaves in each experiment developed fewer local lesions (visible disease sites) than did untreated leaves. Test viruses were southern bean mosaic, tobacco mosaic, and alfalfa mosaic.

The compound was also highly effective in preventing development of systemic symptoms (reduction in plant growth) in Black Valentine beans and pinto beans caused, respectively, by tobacco ringspot and yellow bean mosaic viruses.

The inoculum of virus-infected juice and abrasive was brushed on leaves of test plants. Surfactant was sprayed on 15 minutes later.

DOSS prevented reduction in growth by tobacco ringspot. Left to right: control; inoculated plant; inoculated, treated plant.

Although DOSS assists penetration of other chemicals into plants, the compound was not found to move into plants or to be translocated in effective amounts through leaves or roots. It apparently moved into plant cells, as did the viruses, through openings made by the inoculation procedure. Thus, it may be useful as a protection against insect-transmitted viruses, which gain entry into plants through openings made by insects.

The scientists believe activity of DOSS may be two-fold—it destroys infectiousness of virus particles and interferes with initial virus multiplication.

In some experiments with southern bean mosaic virus, treatments were made 16 hours and 30 hours after inoculation. Lesions were smaller in treated leaves than in untreated leaves, even when no reduction in number of lesions occurred. This indicates that the amount of virus formed per infection site was reduced, although infection was not prevented.

Moreover, even when no visible lesions occurred, Schneider and Mitchell were able to recover some virus from treated, inoculated leaves 5 days later. Recovery of virus indicates that infection did take place but that virus multiplication did not proceed effectively enough to produce visible symptoms.

How DOSS is able to inhibit virus isn't known, but its action is directly correlated with its ability to reduce surface tension of water. Four other compounds related to DOSS were also tested, and it was found that increasing ability to reduce surface tension of water paralleled effectiveness in antiviral activity.☆

Supplement Protects Sheep from Halogeton

■ Dicalcium phosphate—a mineral supplement that is commonly used in livestock feed—prevents the poisonous weed halogeton from killing sheep, according to USDA research veterinarian Wayne Binns.

Sheep fed alfalfa pellets containing 5 percent of the supplement were protected against poisonous oxalates in halogeton. These oxalates kill sheep by depleting blood serum of its calcium. Dicalcium phosphate, readily absorbed into a sheep's blood system, replaces calcium removed by the oxalates. Other supplements used in Binns' research did not protect sheep. He tried steamed bone meal, defluorinated rock phosphate, and monosodium phosphate.

Dicalcium phosphate has been used 3 years in feeding trials, and results have been good each season. The research is in cooperation with the Utah Agricultural Experiment Station at Logan.

Halogeton, which is spreading through millions of acres in the West, thrives in salty soils of semiarid parts of California, Nevada, Utah, Idaho, Colorado, Wyoming, and Montana.

As sheep are trailed from winter to summer ranges, losses occur in almost every band moving through halogeton-infested land.

For example, while checking on commercial flocks of sheep being trailed near Snowville, Utah, in 1959, Binns found that a group of hungry animals were allowed to remain overnight on an almost pure stand of halogeton. Of 1,850 sheep, 190 were dead the next morning and 172 others died during the next 3 weeks.

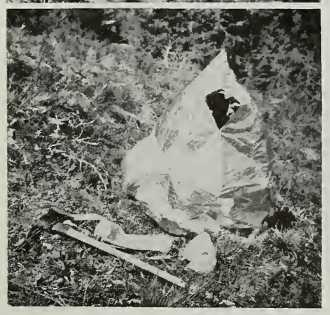
Before sheep were moved from winter ranges in the spring of 1960, Binns advised the owners to supplement the animals' diets with pellets of alfalfa and 5 percent dicalcium phosphate. Owners who fed the supplement lost no sheep. But those who did not follow Binns' suggestion lost animals.

Tests are being conducted to learn if dicalcium phosphate will also protect cattle from oxalate poisoning. (See also AGR. RES., March 1960, p. 14; and April 1957, p. 11.☆

New portable shelter gives trapped forest firefighters

REFUGE FROM FLAME

Lightweight packet on worker's back contains rolled-up shelter. In seconds he can be protected from a fire's radiant heat.



Slit near top is for observation. Shelter might be carried someday by campers, hunters, and hikers in forest fire areas.

Intense heat from a test fire didn't harm a man shielded by the cone-shaped device

■ Forest firefighters will likely value a new portable fire shelter as highly as sailors value lifejackets. About 2,000 of these individual survival shelters—devised by equipment developers of USDA's Forest Service—are available to firefighters now.

Experiments show the cone-shaped shelter protects its occupant from intense radiant heat while the outside temperature may be more than 600° F. The shelter weighs less than 2¼ pounds and is made of aluminum foil with fire-resistant cotton scrim (netting) and paper backing. The foil reflects radiated heat; the scrim and paper provide strength and insulation.

An individual trapped by a forest fire can pull the emergency shelter from its packet (the size of a rolled-up newspaper), open it, get in—and be shielded in only a few seconds. A web belt around the waist is used to hold the packet out of the way on the firefighter's back.

The shelter has a slit near the top for viewing the fire and for ventilation. Two loops are attached to the inner

surface for the occupant to grasp if he has to move the shelter, or to steady it if wind threatens to blow it away.

A volunteer stayed in one of these shelters 31 minutes, without much discomfort, while the temperature of the surrounding fire reached a peak of over 600° F.

Inside the shelter, the temperature reached only about 130°. The upper part of the cone-shaped shelter became quite warm, but the occupant avoided the heat by crouching close to the ground.

The test fire, in piles of logs and branchwood around the shelter, ignited green trees 30 feet away and forced observers at 75 feet to shield themselves from the radiation. Flames didn't envelop the shelter. The test was made at the Forest Service's Missoula Equipment Development Center in Montana.

This shelter is more effective and less expensive than other protective devices tested. Volunteers dressed in aluminized fabric suits could stay in the test fire area only about 2 minutes.

Other aluminized garments tested—poncho, blanket, and gown—come in contact with the body and conduct heat. Inside the tent shelter an average-size man can stay at least 6 inches from contact with hot surfaces of the shelter.☆

Straw Mulch Benefits Fallow Land

■ A ton of wheat straw mulch per acre cut erosion to a minimum, and 2 tons eliminated all runoff and soil loss in fallow plots.

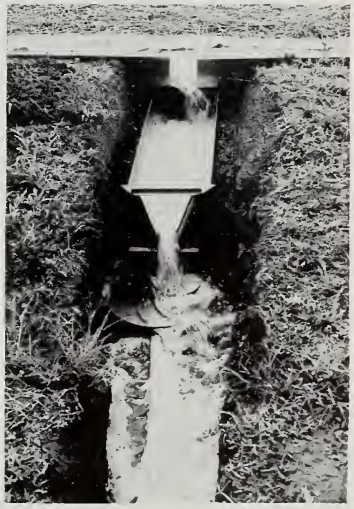
Unmulched plots lost 12 tons of soil per acre.

These results were obtained in a recent study, by USDA and the Indiana Agricultural Experiment Station, comparing effects of mulch on water infiltration and soil erosion.

ARS soil scientist J. V. Mannering and agricultural engineer L. D. Meyer applied ¼, ½, 1, 2, and 4 tons of wheat straw mulch per acre to freshly disked fallow soil about a month after plowing. The soil was highly permeable silt loam with a 5-percent slope. An unmulched plot was used as a control. These plots were subjected to a series of simulated rainstorms, which totaled 6¼ inches of water. The water was applied at a constant intensity of 2½ inches per hour.

No runoff or erosion occurred on the plots mulched with 2 or 4 tons of straw, and only ⅕ ton of soil was lost from the plot that received 1 ton of mulch. The plots mulched with ½ and ¼ ton of straw lost 1 and 3 tons of soil, respectively.

The researchers found that the higher applications of mulch kept the soil surface open, which allowed good infiltration and prevented soil washing. Although the smaller amounts of mulch only slightly increased infiltration, they significantly decreased velocity of the runoff. This, in turn, reduced the capacity of water to wash the soil.☆



Runoff moves through the measuring flume, falls onto revolving wheel, is sampled for analysis of erosion.

Rainfall simulator is used to distribute rain on the mulched (left) and unmulched plots.

More efficient production and processing might result from basic studies of

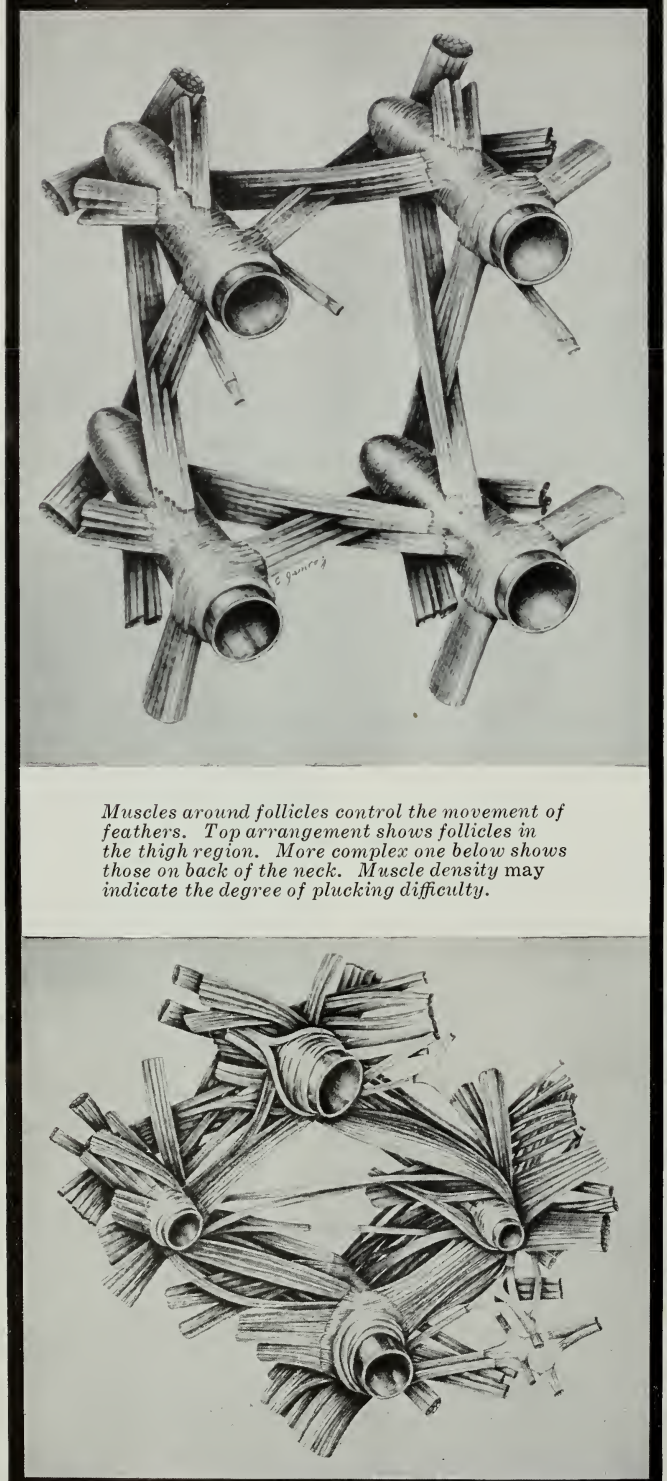
CHICKEN FEA

■ How quickly a young chicken's feathers develop might tell a poultryman the bird's future growth rate.

Also, by knowing about various kinds of feathers on birds they handle, processors may be able to develop more efficient plucking methods.

These are two practical implications of basic findings by ARS zoologist Peter Stettenheim. He is studying *how* and *when* feathers grow and chickens molt. His findings will be included in a multivolume poultry anatomy reference book. The book is being prepared under the direction of ARS zoologist A. M. Lucas and will be published by USDA.

Stettenheim's work at the Regional Poultry Research Laboratory, East Lansing, Mich., reveals:



Muscles around follicles control the movement of feathers. Top arrangement shows follicles in the thigh region. More complex one below shows those on back of the neck. Muscle density may *indicate the degree of plucking difficulty.*

Mature second-generation feathers, left, from wing of a 91-day-old bird. Those at right are young third-generation feathers. New feather, center, is still in its sheath.

EATHERS AND MOLTING

- Feathers develop and are shed at varying rates within specific areas of skin on a chicken's body.
- Feather growth and molting begin in a certain part of each area. This beginning point may be at the center or near the edge of the area, and may shift after a bird molts and new feather growth starts.
- The time of shedding, how fast feathers are shed, and how quickly new feathers grow differ considerably in the various areas.

When studying 35 Single Comb White Leghorn chicks from hatching to 6 months, Stettenheim found that a chicken's plumage always includes feathers of two or more generations. When a bird is 5 months old, four generations of feathers may have grown on some body areas, while natal down (first-generation feathers) will persist on others.

Scientists know about various types of feathers on many kinds of birds, but the schedule by which all feathers are developed and molted in chickens hasn't—until now—been intensively studied.

A newly hatched chick's feathers consist of natal down, except for a few wing and tail feathers already present as ensheathed second-generation feathers.

At 5 months there are a few immature fourth-generation feathers on the upper side of the body and the wings. Most of a chicken's plumage is mature third-generation feathers, with immature ones remaining on all areas of the body. Natal down may still be present in the knee region and in an area beneath where the wing joins the body.

Feathers grow from follicles (tiny cavities) in a bird's skin. All the follicles an adult bird will have are formed when it is an embryo. The follicles first produce small, fluffy down feathers. Later, a second set of larger, stiffer feathers form inside the same follicles. The growth and molting of feathers is repeated at regular intervals during the life of a bird.

A new feather, enclosed by its sheath, replaces a mature one by gradually pushing the old quill out of the follicle. The new feather then emerges from its sheath.☆

ery young ensheathed feather is hing an old second-generation ther out of its follicle on the k of a 62-day-old chicken.

Feather from the upper exterior part of the thigh. Small one at right is an aftershaft that grows from the quill of the main thigh feather.

A feather from the chicken's back. Most fowl feathers have aftershafts. Goose and duck feathers don't have them.

Nelson places seed in a dielectric heater to test the effects of r-f energy. Such tests have increased alfalfa germination by 35 percent.

INCREASING SEED GERMINATION WITH R-F

Alfalfa seed germination was increased to 95 percent by applying radio frequency energy

■ Brief exposure to radio-frequency (r-f) electric fields increased the germination of alfalfa seed by 35 percent in laboratory studies, according to USDA agricultural engineer S. O. Nelson at Lincoln, Nebr.

He found that 95 percent of alfalfa seed containing a high proportion of hard seed germinated after being treated 28 seconds with r-f energy at a frequency of 39 megacycles per second and a field intensity of 3,000 volts per inch. (Hard seed, so named because an impermeable seed coat prevents entry of moisture, occurs in large amounts in alfalfa grown in certain parts of the U.S.) Only 60 percent of identical untreated alfalfa seed germinated.

Storing treated seed for 2 years did not change its acquired ability to germinate.

Nelson says that r-f treatment must be evaluated in relation to other seed-treating methods to learn whether the technique will be practical and profitable for use by commercial seed processors.

Smaller germination increases were also observed in other legumes. Exposure to r-f increased germination of red clover from 74 to 86 percent. Mean germination of treated unhulled crown vetch was nearly doubled but was still very low.

In other tests, r-f energy stimulated corn germination considerably in some cases, but hardly at all in others. Why corn germination was not consistently affected has not yet been explained. Tests on grain sorghum were promising, but inconclusive.

Nelson conducted these experiments with the cooperation of the Nebraska Agricultural Experiment Station.

R-F also kills insects in grain

Previous experiments showed that exposure to r-f energy will kill certain insect pests of stored grain, but this use is still too expensive for commercial purposes (AGR. RES., October 1953, p. 10).

Application of r-f might also be used to selectively kill weed seeds in crop seeds. Enough r-f energy will kill any seed, but researchers have not yet accurately determined whether any kinds of weed seeds are more susceptible to damage from such treatments than are crop seeds.

Scientists have not yet learned whether the improved germination due to r-f treatment results from chemical or physical changes in the seed, or from both. Exposure to r-f heats seeds and chemically changes the sugars of certain varieties. Exposure also increases the capacity of some hard seeds to absorb water, which seems to be a likely cause of increased germination.

Nelson and his cooperators are continuing research to learn if r-f has practical use in seed processing and to get more basic information about the effects of r-f energy on seeds and seed pests.☆

Studies Confirm Advice on Heifer Culling

■ Of every 100 bred heifers that fail as a 3-year-old to produce a calf, 29 will fail to calve the next year, too. That's what USDA and Montana researchers found when they studied 30-year calving records of cattle at the U.S. Range Livestock Experiment Station, Miles City, Mont.

Their findings confirm the practical advice given many cattlemen: if heifers are bred and don't conceive, it's often wise to cull them as soon as possible.

During the 30 years, 1,589 heifers were bred during their third year. Those producing a calf then—1,323—averaged an 86.8-percent lifetime calf crop.

Those that didn't calve as 3-year-olds had a lifetime calving average of 54.9 percent. This low percentage, however, includes records of cows that never calved. Cows in this experiment were culled if they failed to calve at both 3 and 4 years of age. Abortions and stillbirths were included in the data so cows' conception rates could be gaged.

Cows having their first calves at 4 years averaged an 83.5-percent lifetime crop. This indicates that 3-year-olds failing to conceive will either remain sterile (about 29 percent), or are likely to subsequently match the lifetime calving percentages of cows that calve as 3-year-olds.

ARS animal husbandmen F. J. Rice, R. R. Woodward, and J. R. Quesenberry, and Montana Agricultural Experiment Station animal husbandman F. S. Willson conducted the study.

The effect inbreeding has on fertility was also studied. Calving rates were about 85 percent for cows with less than 10 percent inbreeding. Those with more inbreeding produced less than a 79-percent crop.

Previous calf's sex had a slight influence on the cow's subsequent conception rate. Cows nursing bull calves produced 1.8 percent fewer calves the next year than those having female calves.

A recent USDA and Louisiana study showed the effect of a calf's sex on the dam's subsequent fertility. Cows having male calves produced about 5 percent fewer offspring. Reasons for this aren't known. Researchers think the lower rates may be due to greater difficulties in giving birth to the larger males, and greater nutritional demands on cows nursing bull calves.☆

LABORATORY TESTS AID WATERWEED RESEARCH

• Two simple laboratory tests to appraise the effects of experimental herbicides on waterweeds have recently been devised by USDA and Department of Interior scientists at Denver, Colo.

One test is used to gage a herbicide's toxicity to weeds in ponds and standing water. The other measures effectiveness of herbicides in controlling weeds in flowing streams and irrigation canals.

These tests enable scientists to evaluate more chemicals—using smaller samples of each—than if streams or ponds are used.

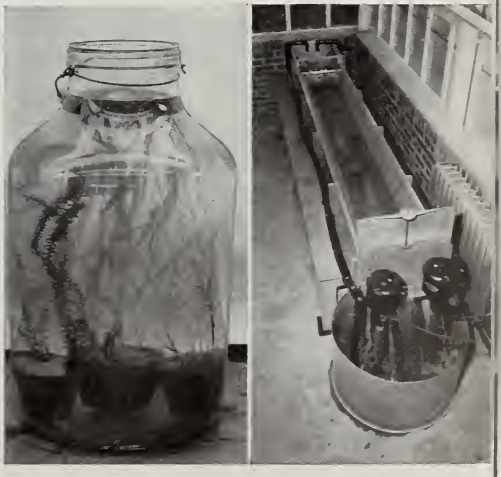
Potted aquatic weeds are placed in large glass jars filled with water containing the experimental weedkiller. This simulates the action of the chemical on weeds growing in standing water.

A trough and two sump pumps to circulate water are used to simulate stream and canal waterflow. Potted plants in the trough are immersed in the flowing water-herbicide solution. After 30 minutes, plants are removed, rinsed, and put in jars filled with water.

In both tests, plants are checked weekly to gage the effects of the herbicides being evaluated.

The tests were devised by ARS plant physiologist P. A. Frank, cooperating with plant physiologist N. E. Otto and chemist T. R. Bartley, Bureau of Reclamation, Department of Interior.☆

These simple devices allow realistic indoor tests of weedkillers' effects on waterweeds infesting farm ponds, streams, and irrigation canals.



NEW ROSE SPRAY CONTROLS INSECTS AND DISEASES

Test chemicals were mixed by worker at rear of truck, then applied to rose bushes with hand-sprayers.

Growers can buy the four ingredients to mix an effective combination that will aid in maintaining healthy, productive plants

Insecticide, Fungicide, or Miticide	Wettable Powder (WP), or Emulsifiable Concentration (EC), Percent Recommended	Amount Per Gallon (Teaspoons)
(A) *LINDANE*	25 *WP*	3
	25 *EC*	1
(B) *DDT*	50 *WP*	5
	25 *EC*	3
(C) *ARAMITE*	15 *WP*	4
MALATHION	25 *WP*	6
	57 *EC*	2
KELTHANE	18.5 *WP*	3
	18.5 *EC*	1
TEDION	25 *WP*	2
(D) *PHALTAN*	75 *WP*	4½
MANEB	70 *WP*	4½

Take one chemical from each of the four lettered groups and mix in a gallon of water to treat about 20 bushes.

■ An improved combination chemical spray for guarding roses against insects, mites, and diseases can be prepared by growers at home.

Earlier blooming, more blossoms per plant, bigger plants, and better winter survival result because spraying prevents these enemies from weakening and crippling rose bushes.

Chemicals for preparing the spray combination are sold separately at most garden supply and hardware stores. ARS entomologists F. F. Smith and T. J. Henneberry and pathologist J. G. Palmer developed the spray at the Agricultural Research

Center, Beltsville, Md. They recommend spraying weekly during the growing season (about 15 times).

Lindane and DDT are two of the four ingredients in the spray. These ingredients are for controlling leafhoppers, aphids, and other insects. As a third ingredient to protect roses against spider mites, the rose grower can choose Aramite, Tedion, Malathion, or Kelthane. The perennial weeds fleabane, chickweed, and henbit should be removed from rose beds in early spring. Spider mites overwinter on these weeds.

Either Phaltan or Maneb can be used as the fourth ingredient for protection against black spot, a fungus. Such protection is the principal improvement in the spray over a multipurpose dust recommended earlier (AGR. RES., June 1955, p. 12).

The spray chemicals are approved

Chemicals used in the spray and the earlier dust are approved by USDA for use on ornamental plants. The compounds do not harm plants if applied in recommended concentrations. Tests show the chemicals do not weaken each other's effect when applied together.

Tests of chemicals on rose plants began in 1950 and are continuing. Support from the American Rose Foundation and a spray manufacturer is aiding the research.

Scientists are now evaluating the effectiveness of filler powders for diluting dusts, and they are testing wetting agents that increase penetration and sticking of sprays.☆

Shipping Bee Semen by Mail

■ A method of mailing honeybee semen in small glass tubes has been perfected by a USDA researcher.

Now bee breeders and scientists can import semen of desirable bee breeding stock into North America, using the procedure developed by ARS entomologist Stephen Taber III. He is cooperating with the Louisiana Agricultural Experiment Station.

Entry of live adult honeybees from other parts of the world is prohibited by the U.S. and Canada to avoid introduction of a parasitic mite (*Acarapis woodi* Rennie). This mite, which lives and reproduces in the tracheae of bees, weakens them so they are unable to fly. Severe mite infestations kill many bees.

Semen is shipped in 2-inch-long glass capillary tubes. Semen from 30 to 40 male bees is put in each tube and centrifuged at 10,000 revolutions for about 1 minute. This packs the semen and excludes air bubbles. Open ends of the tube are then sealed by flame.

Taber cuts pieces of ¼-inch plywood to fit standard-size envelopes and inserts sealed tubes into holes drilled in the plywood.

His most successful shipments were by regular mail from Baton Rouge, La., to cooperators in California, Illinois, and Iowa. Fertile eggs were laid by 17 of 18 queens inseminated with the semen.

Plans are being made to attempt the introduction of semen from bees at the Rothamsted Experiment Station in England, and of queens in the egg, larval, and pupal stages. This will be done by G. F. Townsend of Ontario (Canada) Agricultural College, in cooperation with ARS entomologist C. L. Farrar at Madison, Wis.

Canadian entomologist M. V. Smith will take the genetic material to the Baton Rouge laboratory. There adult queens will be raised and inseminated with the semen of the same stock lines brought from England. Daughter queens from these matings will be sent to Canada and to U.S. researchers and breeders.

In 1960, an experiment by Taber and Louisiana entomologist M. S. Blum encouraged work on the mailing technique. They successfully inseminated queens with semen stored as long as 68 days.

And in 1959, Louisiana entomologists Otto Mackensen and Taber demonstrated that shipping honeybee semen by regular mail was possible. Mackensen inseminated 10 queens at Madison, using semen sent from Baton Rouge. Eight of these queens produced all-worker progeny.☆

Modernized House Plan Features

OUTDOOR LIVING

Our most popular house has been redesigned as a contemporary home for the farm and suburb

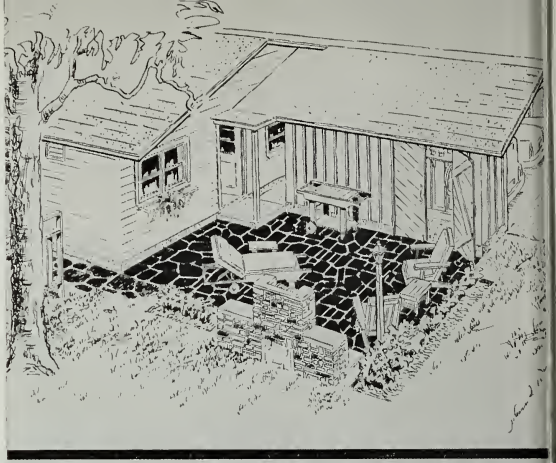
■ An outdoor patio, a carport, and a covered walkway are features of a new streamlined version of USDA's most popular farmhouse plan.

Originally designed 25 years ago, the house has been so popular with farm families that ARS agricultural engineers and housing specialists decided to redesign it as a contemporary home. The new plan (No. 7138) is equally suited to farm and suburban locations.

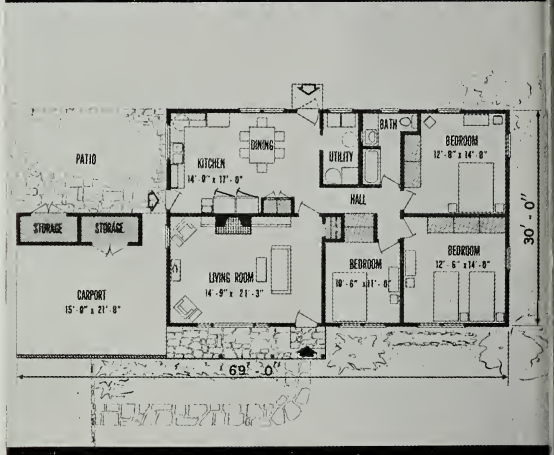
Although the exterior appearance has been changed considerably, the floor plan is basically the same as in the original house. The simple lines, good proportions, and economical use of space have been kept. So has the efficient traffic pattern, which provides a direct passageway between front and back doors and a small hall leading to all the rooms.

New features include more closet space in the bedrooms, a larger dining area in the kitchen, and a utility room with laundry tubs which provide a place to wash up close to the back door. (A version of the new plan—No. 7143—includes a basement.)

Working drawings for any of these plans may be obtained from the extension agricultural engineer at most State agricultural colleges. There is usually a small charge.☆

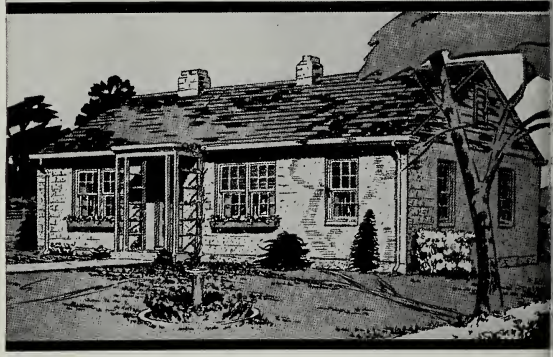


Patio, with storeroom adjacent, provides a convenient, attractive outdoor living area for entire family.



Room sizes, closets are generous in revised plan. House, carport, and storage areas cover 1,860 sq. ft.

Picture window, carport, covered walkway help to give streamlined, spacious look to new farm house.



The original house, built in 1936, had good basic lines and well-planned space. These have been kept in the new plan.

Nemaguard rootstock is available

Budwood of a root-knot nematode-resistant peach rootstock variety, developed by USDA and released in 1959 as FV–234–1, is now commercially available as Nemaguard.

Seed from Nemaguard fruit is valuable for growing rootstock, and the percentage of germination is high. However, the small, white, cling-type peaches are inedible.

Before release, the rootstock was tested for about 10 years by ARS scientists at Beltsville, Md., Fort Valley, Ga., and Fresno, Calif. Nemaguard also has been commercially tested by several grower-cooperators in a number of peach-growing areas where the root-knot nematode is a serious problem. Since 1955, all varieties tested on Nemaguard rootstock have produced good growth and yields.

Nemaguard is comparable to Lovell and Elberta, the rootstocks in most common commercial use today. These two rootstocks do not resist the root-knot nematode.

Although Nemaguard is a promising rootstock, little is known about its long-term production, tolerance to winter injury, and resistance to nematodes other than root-knot.

Limited amounts of the budwood are available from the U.S. Horticultural Field Station, 2021 South Peach Avenue, Fresno; the U.S. Horticultural Laboratory, Fort Valley; or Stone Fruit Investigations, Plant Industry Station, Beltsville.

Feed antioxidant use may increase

Feed processors in 1960 used Ethoxyquin, an antioxidant, to treat about 250,000 tons of dehydrated alfalfa meal and much mixed feed.

Two recent developments promise greater use of the antioxidant in 1961. Ethoxyquin has been cleared for use in all types of animal rations, and a new, more economical water-emulsion form is available.

The chemical greatly reduces normal oxidation losses of carotene, xanthophylls, and vitamin E (all important to livestock nutrition) from feeds. Ethoxyquin was developed by ARS scientists at USDA's Western utilization laboratory, Albany, Calif. They cooperated with State experiment stations and industry.

Ethoxyquin, dissolved in animal fat, is sprayed on feed. The fat is a solvent for the antioxidant and also helps reduce dust due to feed processing and handling. The new water emulsion form isn't dissolved in fat.

Genetic markers from irradiation

A 13-year study of the effects of irradiation on chromosomes in corn has resulted in a valuable source of genetic markers for identifying chromosomes that carry genes controlling specific plant characteristics.

The markers, chromosome translocations resulting from irradiation, are particularly useful in studies of quantitative traits (those controlled by many genes), such as resistance to leaf blight.

Translocations occur when a fragment of one chromosome breaks off and becomes attached to another chromosome. Usually, fragment exchange takes place between two chromosomes.

Over 1,000 different translocations in the 10 pairs of chromosomes in corn were detected and identified in the research.

Translocations are useful as markers because they have no effect on plant growth except for causing semisterility in pollen and egg cells. Because translocations produce semisterility in pollen, they also may be useful in breeding to save time in identifying plants with the desired inheritance. Semisterility would later be bred out.

The research, which was initiated to compare effects of different ionizing radiations on chromosomes, showed the different radiations produced by X-rays, atomic bombs, and other sources gave similar results.

The study was made by ARS geneticist A. E. Longley (retired) and geneticist E. G. Anderson of the California Institute of Technology, where the seed is maintained.

They examined cells of plants from nearly a million seeds that had received miscellaneous radiation treatments, including some from the atomic bomb tests on Bikini in 1946. Other radiation effects found were chromosome inversions and deletions.

Powder made of cottage cheese whey

A process for spray-drying cottage cheese whey into a powder has been developed by USDA scientists.

This technique, which can be used commercially, provides the first opportunity for using cottage cheese whey profitably. Cottage cheese whey generally is discarded because it is perishable and is expensive to ship undried.

Cottage cheese whey powder has potential use in prepared food prod-

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ucts and animal feeds. Whey contains most of the sugar of milk used in making cottage cheese, plus parts of the protein and calcium, much of the salts, and fairly large amounts of riboflavin and other B vitamins.

The method dries whey from an original moisture content of 93 or 94 percent to about 2 percent. This procedure was developed by dairy scientists F. P. Hanrahan and B. H. Webb of the ARS Eastern utilization division, Washington, D.C.

They first concentrate whey to 40 or 50 percent solids in a conventional vacuum evaporator. Next, the concentrate is preheated and pumped under pressure into a specially constructed mixer. Either nitrogen, air, or carbon dioxide, under pressure, is injected into the concentrate in the mixer. Then the mixture is sprayed into a drying chamber as large, foamy particles which are dried.

The resulting free-flowing powder is storable and economical to ship. Powder made by this process is not yet commercially available.

Device blends and meters seeds

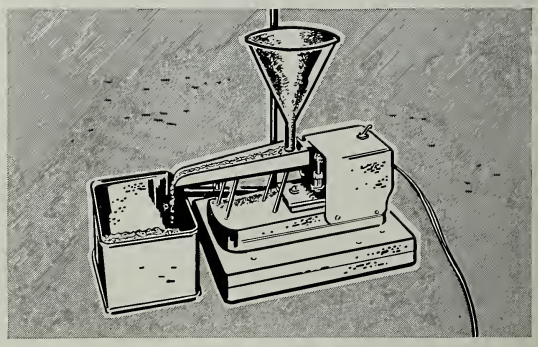
An experimental device that accurately blends and meters seeds has been developed by a USDA scientist.

Large feeders of this type may prove useful to commercial seed processors who need better ways to convey, meter, and blend seeds.

Called a vibratory feeder, the new machine conveys seeds at an even rate from a hopper to a container by shuffling them along a constantly vibrating trough. Two or more feeders can be used to blend different seed varieties in precise proportions.

Agricultural engineer J. E. Harmond of ARS, working in cooperation with the Oregon Agricultural Experiment Station at Corvallis, based the new model on a similar device used in industry to convey or meter granules. Harmond reports that the small feeder he designed costs considerably less to build than the industrial model, and that larger feeders based on the new design can also be constructed at a relatively low cost.

The feeder consists of a hopper mounted on a trough. The trough is vibrated by a cam driven by an electric motor. Each vibration throws seeds slightly forward. The rate and size of vibrations can be adjusted to increase or decrease the rate at which seeds move along the trough. They can be moved in a slow trickle or, in the case of alfalfa, as fast as 1/4 ton per hour.



Device consists of a hopper, trough, and cam driven by an electric motor. The cam hits the bottom of the trough, moving seeds to a container by tossing them slightly forward.

Over 80 percent in campaign

More than 80 percent of the Nation's counties are now enrolled in the effort to eradicate brucellosis.

A recent tabulation showed that 2,523 of the 3,152 counties in the U.S. and its possessions are taking part. And counties are joining the State- and USDA-conducted program much faster than before, says R. J. Anderson, director of animal disease eradication for ARS.

Last October, only 75 percent of the counties were participating. About a year ago, the figure was 71 percent. This indicates, Anderson points out, that all counties could be enrolled by 1963.

At present, 25 States, Puerto Rico, and the Virgin Islands are modified-certified brucellosis areas. At least 2,130 counties have the same status. The goal for complete certification is 1965.

All of New Hampshire and 56 counties are brucellosis-free.

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